

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Electrical Panelboard

We, SQUARE D COMPANY of 6060 Rivard Street, Detroit 11, Michigan, United States of America, a corporation organized and existing under the laws of the State of Michigan, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to improvements in assemblies of electrical circuit controlling devices for the provision of a plurality of electrical supply points and which are hereinafter referred to as panelboards. Switches, circuit breakers and fuses are intended to be comprised in circuit controlling devices as herein referred to.

It is an object of the present invention to improve the constructional design of panelboards with a view to facilitating the arrangement of electrical supply sources presented by panelboards.

According to the present invention there is provided an electrical distribution panelboard comprising an enclosing structure having an interior assembly mounted therein with at least a pair of longitudinally extending distribution busses supported on said interior assembly, transfer busses fixed to said pair of distributing busses to extend from one of the pair towards the other of the pair, the interior assembly providing mounting means extending in a continuous manner longitudinally along the sides thereof, and a plurality of circuit controlling devices, each comprising clamping means for ready engagement with and disengagement from said mounting means, removably within said panelboard by said mounting means and said transfer busses in a pair of rows to present electrical supply terminal connections to the outward sides of the controlling devices.

The interior assembly may comprise a sheet having edges folded up to form a

(Price 3s. 6d.)

U-shaped member the mounting means being secured to said folded edges. Line terminal connections and a main supply disconnecting device may be connected in series with the distribution busses.

Each circuit controlling device may comprise a plurality of spring jaw clips, one of which clips being mounted on said mounting means and at least one other of which clips making electrical connection to one of the transfer busses.

The interior assembly may comprise means for electrically insulating the distribution busses from said interior assembly including notched insulating means arranged adjacent the ends of each of said busses for holding said busses against the interior assembly.

The panelboard may comprise a pair of distribution busses extending longitudinally to either side of a central line of said interior assembly.

There may be provided a barrier of insulating material between each of said pair of distribution busses, said barrier being supported in said notched insulating means and having notches therein to receive the transfer busses.

Longitudinally alternately occurring transfer busses may be electrically connected to a different one of the pair of distribution busses, the transfer busses being bent to present electrical contact surfaces in a plane different from the plane in which the distribution busses lie. Each of the circuit controlling devices may comprise single pole and double pole means connected to one or the other of the distribution busses and both distribution busses respectively.

The circuit controlling devices may comprise means each having a pair of sockets for circuit interrupting elements therein and a pair of circuit terminals, one of said sockets being connected to one of said terminals and the other of said sockets being connected to the other of said terminals.

Price 4s 6d.

Price 2s.

The circuit controlling devices may be plug-in fusible circuit controlling devices each comprising a casing of insulating material, a plurality of load connection terminals at one side of said casing, means for connecting the device to an electrical power source located at the other side thereof, a like plurality of fuse receptacles within said casing, means for electrically attaching each of said receptacles respectively to a load terminal and electrically conducting means for energizing said receptacles from said connecting means.

Each such controlling device may comprise a pair of fuse receptacles and a pair of load terminals with support means for said casing comprising a pair of spring jaw clips one at each end of said casing.

Reference is now made to the accompanying drawing in which are illustrated embodiments of the present invention here given by way of example and in which:—

Figure 1 is a front elevational view of a panelboard with portions of the cover broken away to show internal parts.

Figure 2 is a sectional view taken along the lines II-II of Figure 1.

Figure 3 is a sectional view taken along the lines III-III of Figure 1.

Figure 4 is a side elevational view of a circuit controlling element of the panelboard and taken along the viewing line IV of Figure 1.

Figure 5 is a sectional view taken along the lines V-V of Figure 4.

Figure 6 is a sectional view taken along the lines VI-VI of Figure 8.

Figure 7 is a sectional view taken along the lines VII-VII of Figure 8.

Figure 8 is a bottom plan view of the circuit controlling device of Figures 6 and 7 and taken along the line VIII-VIII of Figure 6.

Figure 9 is a partial elevational view of a circuit controlling element of the panelboard illustrating the terminal end of the element.

The electrical panelboard comprises a box-like enclosure 1 having an interior assembly 2 of electrical distribution devices supported therein. The box 1 comprises a channel-shaped member 3 having sides 4 and 5 with upper turned-over lips 6 and 7 and a pair of end caps 8 and 9 with complementary turned-over lips 11 and 12. A cover 13 having a hinged door 14 is secured to the box 1 as by screws 15 extending through the cover 13 and threading into threaded holes 16 in the flanges 6 and 7 of the box side walls. Lanced knockouts are provided in the back wall 3 of the box 1 for the entry of conduits and conductors to and from the circuit controlling devices of the panelboard.

The interior assembly of the panelboard comprises a sheet metal pan 18 with turned-

up edges 19 and 21 having, respectively, a pair of support members 22 and 23 with rolled beads 24 and 25 secured thereto as by welding. The support members 22 and 23 extend generally throughout the lower half of the interior pan, while the upper half of the pan, as illustrated in Figure 1, remains unbeaded.

Supported within the lower half of the interior assembly is a pair of electrical distribution busses 26 and 27 insulated from the bottom of the pan 18 by a sheet of insulating material 28 and spaced above the insulating material by a plurality of spacing screws 29 of insulating material and having their threaded shanks threaded into tapped holes in the electrical distribution busses 26 and 27. The insulating sheet 28 has a plurality of holes 31 pierced therethrough in a zig-zag fashion along the lower half of the length thereof and the sheet metal pan 18 has a corresponding plurality of tabs 32 lanced and folded from the base thereof so as to extend up through the cut-out holes 31 in the insulating sheet 28. Along the centre of the lower half of the interior assembly and spaced between the tabs 32 is a sheet of insulating material 33 having arcuate cut-out slots 34 evenly spaced along the length thereof. A pair of insulating barriers 35 and 36 is provided at the upper and lower ends, respectively, of the lower half of the interior assembly, each having cut-out slots 37, 38 and 39 for co-operation with the distribution bus 27, the insulation barrier 33, and the distribution bus 26, respectively. A pair of brackets 41 and 42 are provided substantially at the centre of the interior assembly secured to the sides 19 and 21, respectively, of the sheet metal pan 18 and the insulating plate 35 is secured thereto by suitable screws. At the lower end of the interior assembly a pair of brackets 43 and 44 are secured to the bottom of the sheet metal pan 18 and in a similar manner have the insulating plate 36 secured to their turned-up sides. In the manner of the foregoing assembly, the pair of distribution busses and the insulating barrier 33 are supported within the interior pan assembly.

A plurality of terminal transfer busses 45 is attached to the distribution busses 26 and 27 as by screws 46 in an alternate side for side manner throughout the generally lower half of the distribution panelboard and each is bent as at 47 and pressed into a terminal portion of circular cross section at 48. The rod-like portions 48 extend into the arcuate cut-outs 34 along the length of the insulating barrier 33 having substantially equal portions thereof on either side of the insulation barrier.

At the upper half of the interior assembly above the insulating barrier 35 a main disconnecting device 51 which may be either a

switch, a breaker or a pullout fusible device is supported by suitable screws 52 extending therethrough and threading into the bottom of the sheet metal pan 18. The main disconnecting device 51 is provided with terminal lugs at 53 to which line conductors may be connected and a pair of transfer busses 54 are connected to the load side of the main disconnecting device by attaching bolts 55. Attaching bolts 56 individually attach one of the transfer busses to each of the main distribution busses 26 and 27 at portions thereof extending through the insulation barrier 35.

Neutral bars are provided at 61 on both sides of the main disconnecting device 51 and are interconnected by a copper bus 62 passing beneath the main disconnecting device 51 and secured to the bottom thereof by suitable screws, not herein shown. A main neutral lug 63 is secured to the neutral bus 62 and a stabilizing bar of steel or the like is secured to the base of the main disconnecting device 51, in the same manner as the neutral bus 62, and to the neutral bars 61 to provide for rigidity and stabilization alone. With the neutral bars and busses mounted in the foregoing manner, they will be electrically insulated from the interior assembly by means of the insulation sheet 28; however, when so required by electrical codes, the neutral assembly may be grounded to the panelboard box 1 through connection to the interior pan 18 as by optional screw 65 which will pass through the insulation sheet 28 and thread into the pan 18. The interior pan assembly 2 is secured to the bottom of the box 1 by a suitable plurality of nuts 60 threading on to studs welded to the bottom of the box and co-operating with cut-out slots in the top and bottom of the sheet metal pan 18 in the conventional manner.

The fusible switching elements constituting the distribution devices of the panelboard are of a plug-in type and adapted for the accommodation of cartridge type fuses as in units 71 or of Edison type fuses as in units 72. The unit 71 is generally shown in the United States patent of John G. Jackson and Ralph H. Kingdon No. 2,265,233 issued December 9, 1941, in the central portion of the interior assembly shown therein and comprises a moulded case 73 of insulating material having a central cavity at 74 and a moulded removable fuse carrier 75 of insulating material provided with a handle at 76. The casing 73 is provided with a central barrier, not herein shown, and the removable portion 75 is provided with resilient combination fuse holding jaws and knife blade-like contacts constituting a formed conductor 77 of generally U-shape with a pair of legs 78 and 79 for the accommodation of a cartridge type fuse and with leg 79 having an extending portion 81 functioning as a

blade contact. The cover portion 75 is adapted to accommodate two cartridge fuses, one to either side of centre thereof, and the insulating barrier of the moulded casing 73 is adapted to electrically isolate the two fuse holding portions. The removable portion 75 is also adapted to be reversibly positioned within the moulded casing 73 in a manner so as not to contact the electrically energized portions of the casing 73, and in this manner the removable portion 75 functions as a switching unit as well as a fusing unit.

An electrically conductive strip 82 is supported in the base of the moulded casing 73 and is secured to a raised portion 83 in the interior casing as by a screw as shown in Figure 5 near the centre thereof and, at one end thereof, has a spring jaw electrical connecting clip 84 secured thereto by suitable screw 85. Also secured to the conducting strap 82 is a terminal jaw 86 extending to one side of the strap and terminating in a U-shaped contact jaw 87 adapted to accommodate the extending leg 81 of the fuse support 77. At the opposite end, the left side of the fuse holder as shown in Figure 5, a second conducting strap 88 is provided and supported on portions of the casing 73 by screw 89 and has secured thereto by a peened-over rivet 91 a terminal jaw 92 of the same construction as terminal jaw 87 but extending in an opposite direction from the conducting strap 88 as compared to the direction the terminal jaw 87 extends from the conducting strap 82. At the end of the removable portion 75 co-operating with the portion of the moulded insulating casing 73 which supports the conducting strap 88, a second fuse holder 93 is provided and adapted with an extending leg portion similar to that portion previously designated 81 in the fuse holding jaw 77 for co-operation with the terminal jaw 92.

The opposite side of the pullout portion 75 of the fusible switching device 72, in the lower half of the device as viewed in Figure 4, is provided with a similar combination of fuse holding components to those just previously described in relation to the upper half of the pullout portion; however, the switching jaws and the fuse holding jaws of this lower half are reversed with respect to those portions of the upper half of the switching unit. That is, the fuse holding jaw comparable to fuse holding jaw 77 of the upper half of the switching unit will, instead of being on the near side of Figure 4, will be on the far side of Figure 4 and the fuse holding portion 93 will be on the near side rather than the far side of the switching device. The spring jawed portions in the moulded insulation casing 73 for the lower half of the switching unit will be similarly reversed end for end in the casing so that with the portion

75 removed and turned 180 degrees, the extending portions, as 81, will not cooperate with conducting spring jaws, as 87 or 92, but will extend through suitable cut-out portions of the moulded casing not herein shown, and be insulated from electrically energized portions.

A terminal post is provided at 94 in a manner to be both mechanically supported on and electrically connected to the conducting strap 88 and the electrical path through the switching device will be from the spring jaw 84 through the conducting strap 82 to the terminal jaw 87, to the extension 81 of fuse holder clip 77, through a cartridge type fuse supported between fuse holder jaw 77 and fuse holder jaw 93, through an extended leg portion of the fuse holder jaw 93 to terminal jaw 92, to the electrically conducting strap 88 and to the terminal 94 to which a load device may be connected.

A second spring clip 95 of resilient material is suitably supported, in a manner not herein shown, at the end of the moulded casing opposite to that end at which electrically conducting spring jaws 84 are connected to the rod-like portions 48 of terminal busses 45 attached to either of the main distribution busses 26 or 27.

The electrical circuit controlling devices 72 constitute plug-in units having a casing of moulded insulating material 101 with a pair of upper cavities 102 and 103 and a hollow interior portion 104. An electrically conducting strap 105 is supported within the cavity 104 on shoulders 106 and 107 by screws 108, of conducting material, extending through the shoulders 106 and 107 so as to secure to the casing 101, within the cavities 102 and 103, a pair of Edison type threaded fuse sockets 109 and 111. The heads of screws 108 are provided with enlarged shoulders 112 adapted to engage an insulation washer 113 and to support, with the base of the sockets 109 and 111, transfer conducting straps 114 and 115, respectively. The transfer strap 114 extends through a cut-out slot at the end of the casing 101 and terminates in a terminal 116, and transfer strap 115 is secured to a conducting strap 117 by screw 118 with conducting strap 117 extending along one side of the insulating casing 101 and extending through a cut-out in the side thereof to terminate in a terminal 119. Terminals 116 and 119 are separated by an insulating barrier portion 121 of the casing 101.

Conducting strap 105 extends toward the end of the casing 101 opposite that at which the terminals are provided and has secured thereto, by screws, 123, a spring jaw clip 122 extending beyond the casing 101 at the back thereof. A second spring jaw clip 124 is mounted on an extension of the moulded

insulating casing 101 by a suitable screw as shown in Figure 7 with the spring jaw legs thereof opening toward the back of the casing and turned 90 degrees with respect to the spring jaw clip 122.

The electrical circuit through the circuit controlling device 72 is from the spring jaw clip 122 through conducting strap 105 to screws 108, through fuses, not herein shown, to both Edison type fuse sockets 109 and 111, to the conducting strap 114 and to the terminal 116 from socket 109 and to the conducting strap 115, conducting strap 117, to terminal 119 from socket 111. It should be noted that the electrical connection to the line side of the circuit controlling device 72 for both of the fuse sockets 109 and 111 is through the spring jaw clip 122 and that connections to load devices connected to the circuit controlling device are made at the same end of the circuit controlling device.

The circuit controlling device 72 is mounted within the panelboard through the cooperation of spring jaw clips 124 with the rolled-over mounting bead, 24 or 25, of the side plate 22 or 23, respectively, secured to the sheet metal pan 18 of the interior assembly and, at the other end, through the engagement of the electrically conducting spring jaws 122 with the terminal transfer busses 45 at the tubular portion 48 thereof. It will be apparent that in the case of the circuit controlling devices 71 and 72 that the individual devices will be mounted side by side and end for end with respect to each other so that devices mounted to either of the rolled beads 24 or 25 in the same plane of the interior assembly will be mounted to the same transfer terminal bus 45 at the tubular portion 48 thereof.

In the panelboard any combination of two socket unit Edison type fuse devices shown at 72 and of the two cartridge type fuse devices 71 may be supported in the panelboard within the physical limitations of the interior pan assembly. The panelboard is intended for excitation at the terminal lugs 53 with, for example, a single phase, three-wire 120-240 volt line so that between the main busses 26 and 27 the voltage will be 240 volts. Circuit controlling devices such as 71, which engage electrically the transfer busses 45 of opposite polarity, will therefore provide between their terminal lugs 94 a 240 volt circuit. The circuit controlling devices 72 are electrically connected to only one of the transfer busses 45 such that each of the devices may energize between their terminals 116 or 119 and ground a 120 volt electrical load. The panelboard, therefore, provides for electrical energization of a plurality of both 240 volt load circuits and 120 volt load circuits in any desirable combination within the physical limitations of the panelboard itself.

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Both the panelboard and the individual circuit controlling units comprising the panelboard are easily accessible for connection, removal or change as will be apparent from the foregoing description. Each of the circuit controlling devices 71 and 72 is provided with its load terminal attachment screws in the readily accessible portions so that load conduits or conductors may be connected to individual circuit controlling devices without threading the conductors through inaccessible portions of the panelboard. Each of the circuit controlling units may be readily removed from the panelboard for replacement or change as desired after the cover 13 of the panelboard has been removed, and each of the individual fusing devices within each of the individual circuit controlling devices may be readily removed from its socket when the hinged door 14 of the cover 13 is opened.

#### WHAT WE CLAIM IS:—

1. An electrical distribution panelboard comprising an enclosing structure having an interior assembly mounted therein with at least a pair of longitudinally extending distribution busses supported on said interior assembly, transfer busses fixed to said pair of distribution busses to extend from one of the pair towards the other of the pair, the interior assembly providing mounting means extending in a continuous manner longitudinally along the sides thereof, and a plurality of circuit controlling devices, each comprising clamping means for ready engagement with and disengagement from said mounting means, removably mounted within said panelboard by said mounting means and said transfer busses in a pair of rows to present electrical supply terminal connections to the outward sides of the controlling devices.

2. A panelboard according to Claim 1 wherein the interior assembly comprises a sheet having edges folded up to form a U-shaped member, the mounting means being secured to said folded edges.

3. A panelboard according to Claim 1 or 2 comprising line terminal connections and a main supply disconnecting device connected in series with the distribution busses.

4. A panelboard according to any of Claims 1, 2 and 3 wherein each said circuit controlling device comprises a plurality of spring jaw clips, one of which clips is mounted on said mounting means and at least one other of which clips makes electrical connection to one of the transfer busses.

5. A panelboard according to any preceding claim wherein said interior assembly comprises means for electrically insulating the distribution busses from said interior assembly including notched insulating means arranged adjacent the ends of each of said

busses for holding said busses against the interior assembly.

6. A panelboard according to any preceding claim comprising a pair of distribution busses extending longitudinally to either side of a central line of said interior assembly.

7. A panelboard according to Claims 5 and 6 comprising a barrier of insulating material between each of said pair of distribution busses, said barrier being supported in said notched insulating means and having notches therein to receive the transfer busses.

8. A panelboard according to Claim 6 or 7 wherein longitudinally alternately occurring transfer busses are electrically connected to a different one of the pair of distribution busses, the transfer busses being bent to present electrical contact surfaces in a plane different from the plane in which the distribution busses lie.

9. A panelboard according to any of Claims 6 to 8 wherein said circuit controlling devices comprise single pole and double pole means connected to one or the other of the distribution busses and both distribution busses respectively.

10. A panelboard according to any of Claims 6 to 9 wherein said circuit controlling devices comprise means each having a pair of sockets for circuit interrupting elements therein and a pair of circuit terminals, one of said sockets being connected to one of said terminals and the other of said sockets being connected to the other of said terminals.

11. A panelboard according to any of the preceding claims wherein the circuit controlling devices are plug-in fusible circuit controlling devices each comprising a casing of insulating material, a plurality of load connection terminals at one side of said casing, means for connecting the device to an electrical power source located at the other side thereof, a like plurality of fuse receptacles within said casing, means for electrically attaching each of said receptacles respectively to a load terminal and electrically conducting means for energizing said receptacles from said connecting means.

12. A panel board according to Claim 11 wherein each said circuit controlling device comprises a pair of fuse receptacles and a pair of load terminals with support means for said casing comprising a pair of spring jaw clips one at each end of said casing.

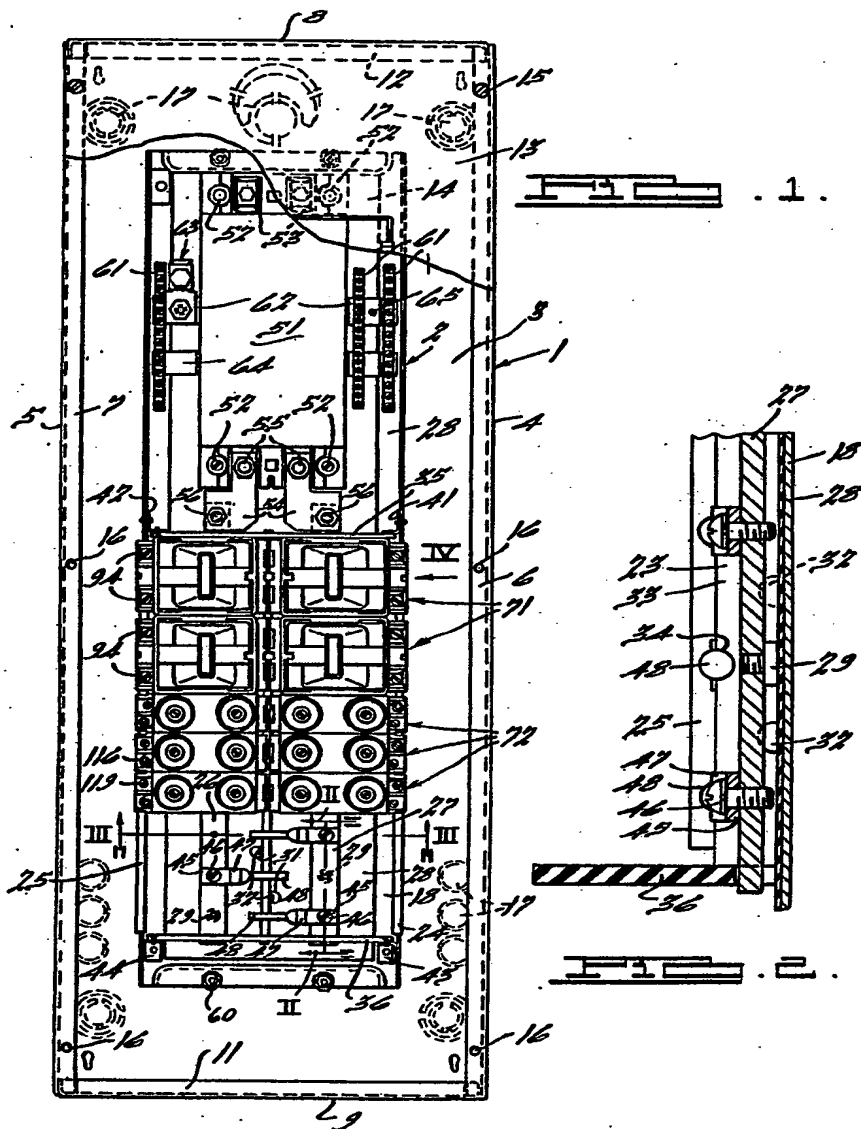
13. A panelboard substantially as described with reference to the accompanying drawings.

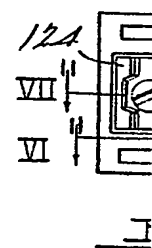
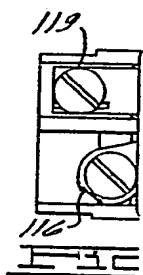
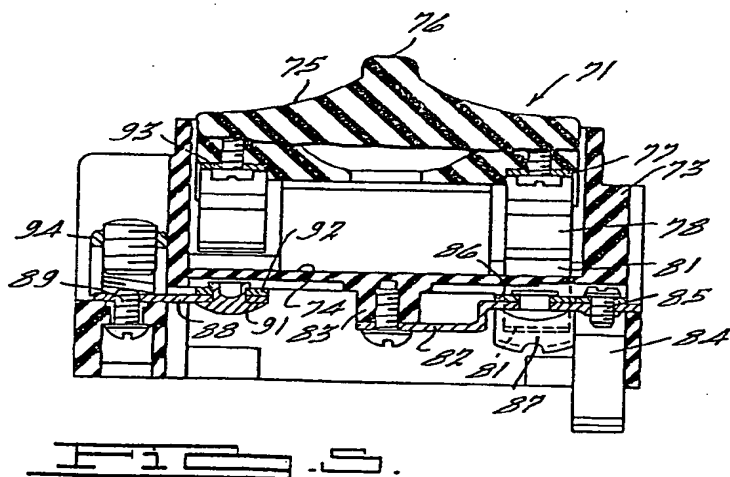
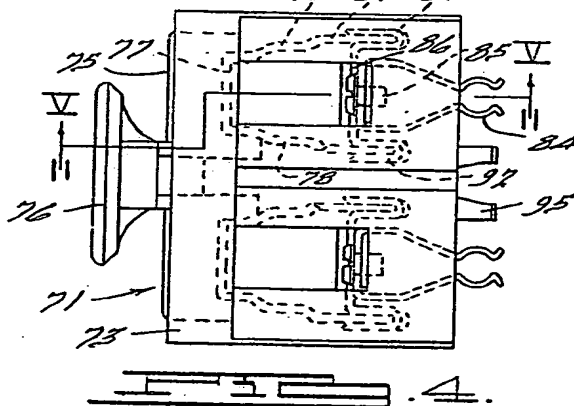
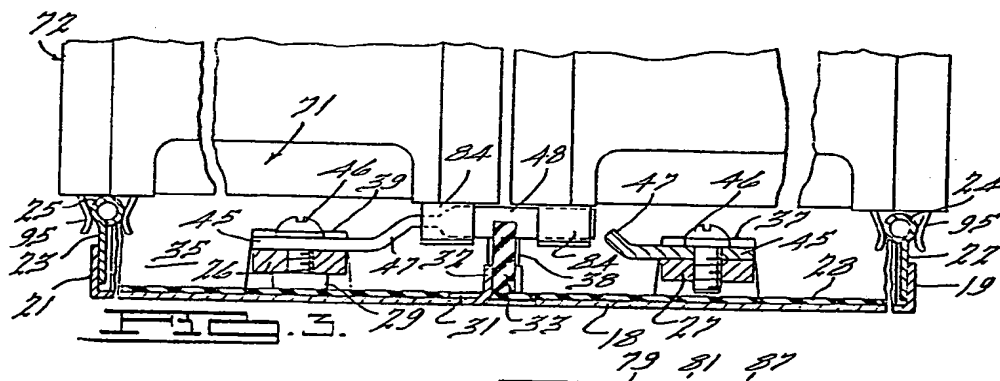
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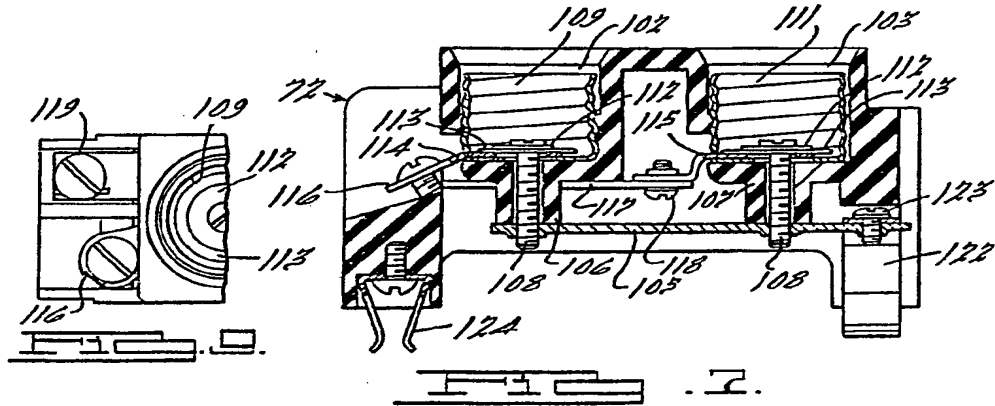
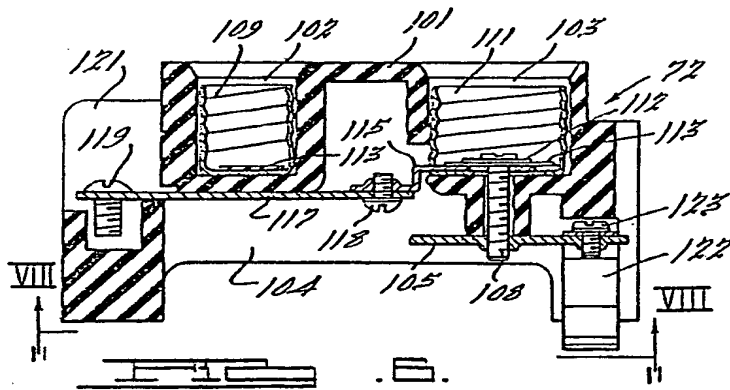
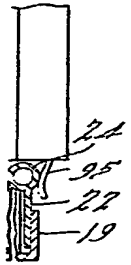
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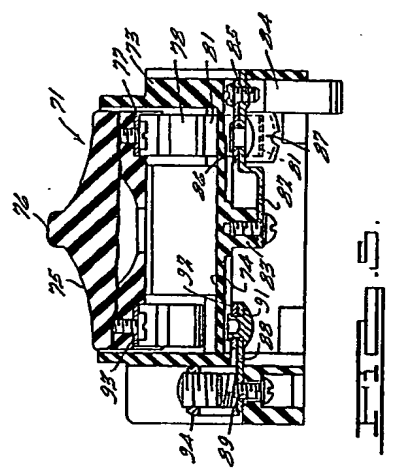
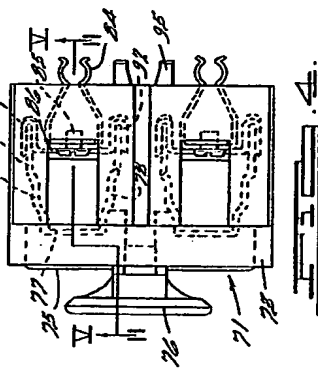
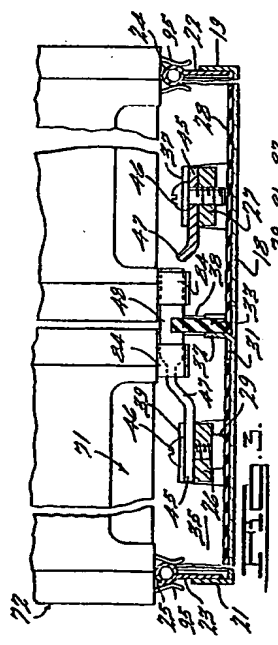








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